The Composition of the SL9 Impact Plumes from Time-Resolved Near-Infrared Spectra

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We have analyzed spectral mapping observations of the collisions of Comet Shoemaker-Levy 9 with Jupiter taken with the Infrared Imaging Spectrometer (IRIS) on the 3.9 m Anglo-Australian Telescope. These spatially (0.6″/pixel) and temporally resolved (~ 2 minutes or less) moderate-resolution (300 $\lambda/\Delta\lambda$) K–band (1.98–2.40 μm) spectra provide detailed descriptions of the impact events, from the time the fragments entered the atmosphere, until their collapsed plumes rotated into view. We are using a sophisticated radiative transfer model with updated spectral line databases to analyze photometrically calibrated spectral sequences of the main events for the impacts of the C and K fragments with Jupiter. The majority of the spectral features observed can be identified with emission from CO, CH_4, NH_3, H_2 and H_2O. The most recent model fits and instantaneous species abundances will be presented, and the modelled effects of viewing angle will be discussed.

We have also examined spatial variations in spectra extracted across the near-infrared impact region approximately 21 minutes after impact of the C fragment. During this 'shoulder' phase of the C main event, we find evidence for apparent spatial variations in relative intensities of CO, CH_4 and H_2 emission. H_2 2.121μm quadrapole emission is most intense relative to the underlying continuum at the southern extreme of the infrared bright region. Features seen between 2.32 and 2.36μm and near 2.385μm also intensify towards the south of the impact region, relative to CO, and have been tentatively identified with H_2O.

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